

Curriculum Vitae

Name: Dr. Antti Lignell

Voice: Tel. +1-323-334-5347, Skype: antti.lignell

Email: lignell@jpl.nasa.gov

Webpage: <http://science.jpl.nasa.gov/people/ALignell/>

Citizenship: Finnish (European Union), United States resident since 2008

Current Position:

Postdoctoral Scientist

Affiliation: Jet Propulsion Laboratory, California Institute of Technology
Mail Stop 183-301, 4800 Oak Grove Drive,
Pasadena, CA 91109, USA
Tel. +1-818-203-3295 (Cell), +1-818-354-2453 (Lab)
Fax +1-818-393-4445

Research Interests:

- Spectroscopy of Chemical, Physical, and Biochemical Processes in Condensed Phases (Optical Spectroscopy from the far-IR to the VUV region and Mass Spectrometry)
- Condensed Phase Photochemistry/-physics
- Intermolecular Interactions and Complex/Nano-cluster Formation
- Dynamics and Tunneling Reactions in Condensed Phases
- Astrochemistry and Astrobiology, Origins of Life
- Atmospheric Chemistry in Ice Particles
- Frontiers of Chemical Reactivity
- Synchrotron Radiation Assisted Research
- First-Principle Calculations and Molecular-Dynamic Simulations to Support Experimental Observations

Education:

- 08/20/2008 **Doctor of Philosophy** (Ph.D.), Physical Chemistry, University of Helsinki
“Intermolecular Interactions of Noble-Gas-Containing species”
Grades: PhD Studies: Outstanding, Thesis: Eximia cum Laude Approbatur,
Defence: Outstanding
Supervisors Prof. Markku Räsänen and Dr. Leonid Khriachtchev
- 04/13/2003 **Master of Science** (M.Sc.), Physical Chemistry, University of Helsinki,
“New Argon and Krypton Compounds and Their Interactions with Surrounding”
Grade: Eximia cum Laude Approbatur, Supervisor Prof. Markku Räsänen
- 07/09/1998 **Reserve Officer Academy**, Finnish Military Forces, 2nd Lt. Rank,
(Military Service Mandatory in Finland)
- 05/31/1996 **Matriculation Exam**, Tampereen lyseon lukio High School, Tampere, Finland

Scientific Employment:

- 10/01/2008-present **NASA Jet Propulsion Laboratory
California Institute of Technology,**
Pasadena CA, United States
Postdoctoral Scientist, Ice Spectroscopy Lab of
Dr. Murthy Gudipati
- 05/26/2009-present
(Visiting Position) **NIST Electron & Optical Physics Division, Gaithersburg MD,
United States**
Guest Researcher, Synchrotron Ultraviolet Radiation Facility
SURF, collaboration between JPL and NIST with Dr. Uwe Arp
- 07/01/2006-10/01/2008 **Laboratory of Physical Chemistry, University of Helsinki,**
Helsinki, Finland
Research Scientist, Center of Excellence project “Computational
Molecular Science”, Academy of Finland
- 01/01/2002-6/30/2006 **Laboratory of Physical Chemistry, University of Helsinki**
Helsinki, Finland
Ph.D. Student (Laskemo Graduate School, Ministry of Education,
Finland) and Teaching Assistant
- 08/01/2000-10/31/2001 **Laboratory of Physical Chemistry, University of Helsinki**
Helsinki, Finland
Summer Trainee and Teaching Assistant

Scientific Positions of Trust:

- **Reviewer** in international peer-reviewed journals [*Journal of Chemical Physics (AIP)*, *Physical Chemistry Chemical Physics (RSC)*, and *Journal of Molecular Structure (Elsevier)*]
- **Member of the local organizing committee** in the 7th International Conference on Low Temperature Chemistry, 08/24/2008-08/27/2008, Helsinki, Finland
- **Local organizer** of the 6th National FTIR Symposium, 05/12/2008-05/13/2008 Helsinki
- **Conference secretary** in 3rd National Meeting of Condensed Phase Spectroscopy and Photochemistry, 11/21/2003, Helsinki, Finland
- **Member of Board** in the Optical Spectroscopy Section of the Association of Finnish Chemical Societies 2006-2008

Pedagogical Experience:

- **Lecturer** in University of Helsinki Lectures Courses (Laser Chemistry, Introduction to Computational Chemistry)
- **Teaching Assistant** in University of Helsinki Courses
- **Teaching Assistant** in Undergraduate and Graduate laboratory studies in Physical Chemistry, University of Helsinki
- **Developer** of the Undergraduate and Graduate laboratory studies in Physical Chemistry, University of Helsinki
- **Supervisor** of three M.Sc. theses in the Laboratory of Physical Chemistry, University of Helsinki
- **Part-time Teacher** of mathematics, physics and chemistry in elementary and high schools
- **Platoon Leader** in the Finnish Military Forces

Interviews:

11/11/2009 **Magazine Interview:** "From Helsinki to California"
Chemistry News Journal, Finland

09/30/2008 **Magazine Interview:** "Astrochemist studying ice at NASA/JPL"
Luova Magazine, Finland

08/04/2008 **Radio interview:** Radio Voima, morning program, Lahti, Finland

12/2004 **Person of the Month**, *Ksenonit* educational portal by the LUMA center,
Faculty of Science, University of Helsinki

05/19/2004 **Radio interview:** Finnish National Broadcasting Company (YLE1),
Science program *Radiaattori* on the topic "Noble-gas chemistry"

Awards and Major Grants:

- 10/01/2008-12/31/2010 **Academy of Finland Grant for Research Abroad (PI)**
“Spectroscopy and Photochemistry of Reactive Species in Cryogenic Water-ice Matrices - Understanding the Evolution of Ices in the Solar System and Galaxies, Underpinning the Quest for Origins of Life in the Universe”
82300 EUR (~115000 USD)
- 07/28/2005 **George C. Pimentel Prize for the Best Poster Presentation,**
Matrix 2005 Conference, Funchal, Madeira, Portugal
- 01/01/2002-01/01/2006 **Ministry of Education Finland, Laskemo Graduate School Grant for Ph.D. Studies in the University of Helsinki**
84000 EUR (~118000 USD)

Citation Metrics:

11/15/2010 Based on 22 Published Articles:

Sum of the Times Cited: 402

Average Citations per Article: 18.27

h-index: 10

Original Publications in Peer-Reviewed International Journals

1. Leonid Khriachtchev, Mika Pettersson, **Antti Lignell**, and Markku Räsänen
“A More Stable Configuration of HArF in Solid Argon”
J. Am. Chem. Soc. **123**, 8610 (2001)
2. Mika Pettersson, Leonid Khriachtchev, **Antti Lignell**, Markku Räsänen, Z. Bihary, and R. B. Gerber
“HKrF in Solid Krypton”
J. Chem. Phys. **116**, 2508 (2002)
3. **Antti Lignell**, Leonid Khriachtchev, Mika Pettersson, and Markku Räsänen
“Large Blueshift of the H-Kr Stretching Frequency of HKrCl upon Complexation with N₂”
J. Chem. Phys. **117**, 961 (2002)
4. **Antti Lignell**, Jan Lundell, Mika Pettersson, Leonid Khriachtchev, and Markku Räsänen
“Kr-Cl Stretching Vibration Mode of HKrCl: Matrix-Isolation and Anharmonic *Ab Initio* Study”
Low Temp. Phys. **29**, 844 (2003), [originally in Fizika Nizkikh Temperatur **29**, 1109 (2003)]
5. **Antti Lignell**, Leonid Khriachtchev, Mika Pettersson, and Markku Räsänen
“Complexation of Rare-Gas Containing Molecules with Nitrogen: Matrix-Isolation and *Ab Initio* Study of HArF...N₂, HKrF...N₂, and HKrCl...N₂”
J. Chem. Phys. **118**, 11120 (2003)
6. **Antti Lignell**, Leonid Khriachtchev, Mika Pettersson, and Markku Räsänen
“A Study on Stabilization of HHeF Molecule Upon Complexation with Xe Atoms”
Chem. Phys. Lett. **390**, 256 (2004)
7. Leonid Khriachtchev, **Antti Lignell**, and Markku Räsänen
“Formation of HArF in Solid Ar Revisited: Are Mobile Vacancies Involved in the Matrix-Site Conversion at 30 K?”
J. Chem. Phys. **120**, 3353 (2004)
8. Leonid Khriachtchev, **Antti Lignell**, Jonas Juselius, Markku Räsänen, and Elena Savchenko
“Infrared Absorption Spectrum of Matrix-Isolated Noble-Gas Hydride Molecules: Fingerprints of Specific Interaction and Hindered Rotation”
J. Chem. Phys. **122**, 014510 (2005)

9. Leonid Khriachtchev, **Antti Lignell**, and Markku Räsänen
“Neutralization of Solvated Protons and Formation of Noble-Gas Hydride Molecules: Matrix-Isolation Indications of Tunneling Mechanisms?”
J. Chem. Phys. **123**, 064507 (2005)
10. **Antti Lignell**, Leonid Khriachtchev, Hanna Mustalampi, Toni Nurminen, and Markku Räsänen
“Interaction of Bihalogen Anions with Nitrogen: Matrix-Isolation Study and First Principle Calculations of the (ClHCl)⁻...N₂ and (BrHBr)⁻...N₂ Complexes”
Chem. Phys. Lett. **405**, 448 (2005)
11. Jan Lundell, Sławomir Berski, **Antti Lignell**, and Zdzisław Latajka
“Quantum Chemical Study of the Hydrogen Bonded HXeOH-H₂O Complex”
J. Mol. Struct. **790**, 31 (2006)
12. **Antti Lignell**, Leonid Khriachtchev, Hanna Lignell, and Markku Räsänen
“Protons Solvated in Noble-Gas Matrices: Interaction with Nitrogen. Matrix Isolation Study and First Principle Calculations”
Phys. Chem. Chem. Phys. **8**, 2457 (2006)
13. Leonid Khriachtchev, **Antti Lignell**, Hanna Tanskanen, Jan Lundell, Harri Kiljunen, and Markku Räsänen
“Insertion of Noble-Gas Atoms into Cyanoacetylene: *Ab Initio* and Matrix-Isolation Study”
J. Phys. Chem. A **110**, 11876 (2006)
14. **Antti Lignell**, Leonid Khriachtchev, Jan Lundell, Hanna Tanskanen, and Markku Räsänen
“On Theoretical Predictions of Noble-Gas Hydrides”
J. Chem. Phys. **125**, 184514 (2006)
15. Hanna Tanskanen, Susanna Johansson, **Antti Lignell**, Leonid Khriachtchev, and Markku Räsänen
“Matrix-Isolation and *Ab Initio* Study of the HXeCCH...CO₂ Complex”
J. Chem. Phys. **127**, 154313 (2007)
16. Hanna Tanskanen, Leonid Khriachtchev, **Antti Lignell**, Markku Räsänen, Susanna Johansson, Ivan Khyzhniy, and Elena Savchenko
“Formation of Noble-Gas Hydrides and Decay of Solvated Protons Revisited: Diffusion-Controlled Reactions and Hydrogen Atom Losses in Solid Noble Gases”
Phys. Chem. Chem. Phys. **10**, 692 (2008)

17. Anastasia V. Bochenkova, Leonid Khriachtchev, **Antti Lignell**, Markku Räsänen, Hanna Lignell, Alexander A. Granovsky, and Alexander V. Nemukhin
“Hindered Rotation of HArF in Solid Argon: Infrared Spectroscopy and a Theoretical Model”
Phys. Rev. B **77**, 094301 (2008)
18. **Antti Lignell**, Jan Lundell, Leonid Khriachtchev, and Markku Räsänen
“Experimental and Computational Study of HXeY...HX Complexes (X, Y = Cl and Br): An Example of Exceptionally Large Complexation Effect”
J. Phys. Chem. A **112**, 5486 (2008)
19. **Antti Lignell** and Leonid Khriachtchev
“Intermolecular Interactions Involving Noble-Gas Hydrides: Where the Blue Shift of Vibrational Frequency is a Normal Effect”, **Review Article**
J. Mol. Struct. **889**, 1 (2008)
20. Alice Corani, Alexandra Domanskaya, Leonid Khriachtchev, Markku Räsänen, and **Antti Lignell**
Matrix-Isolation and *Ab Initio* Study of the HKrCl...HCl Complex
J. Phys. Chem. A **113**, 10687 (2009)
21. Hanna Lignell, Leonid Khriachtchev, **Antti Lignell**, and Markku Räsänen
“Local formation of HArF in solid argon: Low-temperature limit and thermal Activation”
Low Temp. Phys. **36**, 400 (2010)
22. Leonid Khriachtchev, Salla Tapio, Markku Räsänen, Alexandra Domanskaya, and **Antti Lignell**
“HY...N₂ and HXeY...N₂ complexes in solid xenon (Y = Cl and Br): Unexpected suppression of the complex formation for deposition at higher temperature”
J. Chem. Phys. **133**, 084309 (2010)
- 23- Six articles under writing at the Jet Propulsion Laboratory, California Institute of Technology

Participation to International Conferences

1. Euroconference Matrix 2001, The Chemistry and Physics of Matrix Isolated Species
Szklarska Poreba, Poland, 07/07/2001-07/13/2001
Poster presentation: "Photochemistry of HF in Argon and Krypton Matrixes: Formation of HArF and HKrF in Different Sites"
2. 4th International Conference on Low Temperature Chemistry
Keuruu, Finland, 08/03/2002-08/08/2002
Poster presentation: "Large blue-shift of the H-Kr stretching frequency of HKrCl upon complexation with N₂"
3. 4th International Conference on Cryocrystals and Quantum Crystals
Freising, Germany, 10/27/2002-10/31/2002
Poster presentation: "Heavy-atom stretching vibration modes of HKrF and HKrCl: Matrix-isolation and anharmonic ab initio study"
4. 4th Informal Conference on Reaction Kinetics and Atmospheric Chemistry Helsingør, Denmark, 06/13/2003-06/15/2003
Oral presentation: "Interaction of rare-gas-containing molecules with nitrogen: HArF...N₂, HKrF...N₂, and HKrCl...N₂ complexes"
5. Gordon Research Conference on Physics and Chemistry of Matrix-Isolated Species
Lewiston, MA, United States, 07/20/2003-07/25/2003
Poster presentation: "Interaction of rare-gas containing molecules with nitrogen: Matrix-isolation and ab initio study of HArF...N₂, HKrF...N₂, and HKrCl...N₂ complexes"
6. 3rd National Meeting of Condensed Phase Spectroscopy and Photochemistry Helsinki, Finland, 11/21/2003
Oral presentation: "HHeF...Xe_n complex: A possible way for experimental preparation of a helium compound?"
7. 5th Informal Conference on Reaction Kinetics and Atmospheric Chemistry Helsingør, Denmark, 06/11/2004-06/13/2004
Poster presentation: "Stabilization of HHeF molecule upon complexation with Xe atoms"
8. 5th Conference on Cryocrystals and Quantum Crystals
Wroclaw, Poland 08/29/2004-09/04/2004
Poster presentation: "A Way to Prepare First Helium Compound? Stabilization of HHeF upon Complexation"

9. 5th International Conference on Low Temperature Chemistry
Berlin-Dahlem, Germany, 10/07/2004-10/10/2004
Poster presentation: "Intermolecular Interactions of Noble-Gas Molecules"
10. Matrix 2005, The Physics and Chemistry of Matrix Isolated Species
Funchal, Madeira, 07/24/2005-07/29/2005
Poster presentation (Winner of the Best Poster Prize): "Infrared absorption spectrum of matrix-isolated noble-gas hydride molecules: Fingerprints of specific interactions and hindered rotation"
11. XVIth International Conference on Horizons in Hydrogen Bond Research and Graduate School "Hydrogen Bonding and Hydrogen Transfer"
Roskilde, Denmark, 08/29/2005-09/04/2005
Oral and poster presentations: "Exotic intermolecular interactions: The complexes of noble-gas-containing molecules"
12. 6th International Conference on Low Temperature Chemistry
Chernogolovka, Moscow region, Russia, 08/27/2006-09/01/2006
Poster presentation: "Noble-Gas Molecule Complexes"
13. 6th International Conference on Cryocrystals and Quantum Crystals
Kharkov, Ukraine, 09/03/2006-09/08/2006
Poster presentation: "Neutralization of solvated protons in noble-gas matrices: Evidence of mobile electrons"
14. Gordon Research Conference on Physics and Chemistry of Matrix-Isolated Species
Lewiston MA, United States, 07/15/2007-07/20/2007
Poster presentation: "Chemical Compound Prepared from HCCCN and Noble-Gas Atoms: Computational and Experimental Study"
15. XVIIth International Conference on Horizons in Hydrogen Bond Research
Repino, St. Petersburg region, Russia, 09/01/2007-09/08/2007
Poster presentation: "Experimental and computational study of blue-shifting hydrogen bonds: HXeY...HY complexes (Y = Cl and Br)"
16. 7th International Conference on Low Temperature Chemistry
Helsinki, Finland, 08/24/2008-08/29/2008
Member of the Local Organizing Committee, Oral presentation: "Intermolecular interactions of Noble-Gas-Containing Species"
17. American Geophysical Union (AGU) 2009 Fall Meeting
San Francisco CA, United States, 12/14/2009-12/18/2009
Poster presentation: "Laboratory Studies on Low-Energy Electron Penetration Depths into Amorphous Ice – Consequence to Astrobiology on Icy Surfaces"

18. American Chemical Society 2010 Spring Meeting
San Francisco CA, United States, 03/21/2010-03/25/2010
19. Astrobiology Science Conference 2010, Evolution and Life: Surviving Catastrophes
and Extremes on Earth and Beyond
League City TX, United States, 04/26/2010-04/29/2010
Poster presentation: "Can Biosignatures Be Detected on the Surface of Europa
Through Remote Sensing? A Laboratory Study of the Penetration Depths and
Reactions of Electrons with Organics"
20. 2010 Astrobiology Graduate Student Conference
Tällberg, Sweden, 06/14/2010-06/18/2010
Invited Oral Presentation: "Photon and Electron Irradiation of Organic Molecules in
Cryogenic Water Ices - Consequence to Astrobiology"

Invited Presentations in University Colloquia

1. University of Washington, Seattle, Astrobiology colloquium series
"Towards Prebiotic Chemistry in Ice - Evolution of Organics in Cryogenic Ices under
Ionizing Radiation " 11/23/2010
2. University of California. Berkeley
"Towards Prebiotic Chemistry in Ice - Evolution of Organics in Cryogenic Ices under
Ionizing Radiation " (job interview) 12/02/2010
3. University of California, Irvine, AirUCI seminar series
"Evolution of Organics in Ice under Ionizing radiation – From Astrobiology to
Atmospheric Sciences" 01/25/2011